Considerations for Cleanup Design & Challenges at PHSS

Perspectives from Paul Fuglevand

Portland Harbor Collaborative
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Zoom, OR

Photographs and Figures courtesy of Dalton, Olmsted & Fuglevand, Inc.

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35 years of sediment remediation engineering

- EPA Superfund sediment sites in Oregon, Washington, Utah
- Hudson River PCB EPA Superfund site in New York
- Guidance reports
  - *Sediment Dredging at Superfund Megasites, Assessing the Effectiveness*
  - *Technical Guidelines for Environmental Dredging,* Army Corps of Engineers
- Dredging Instructor for US Army Corps of Engineers, 10+years

Questions from the Steering Committee

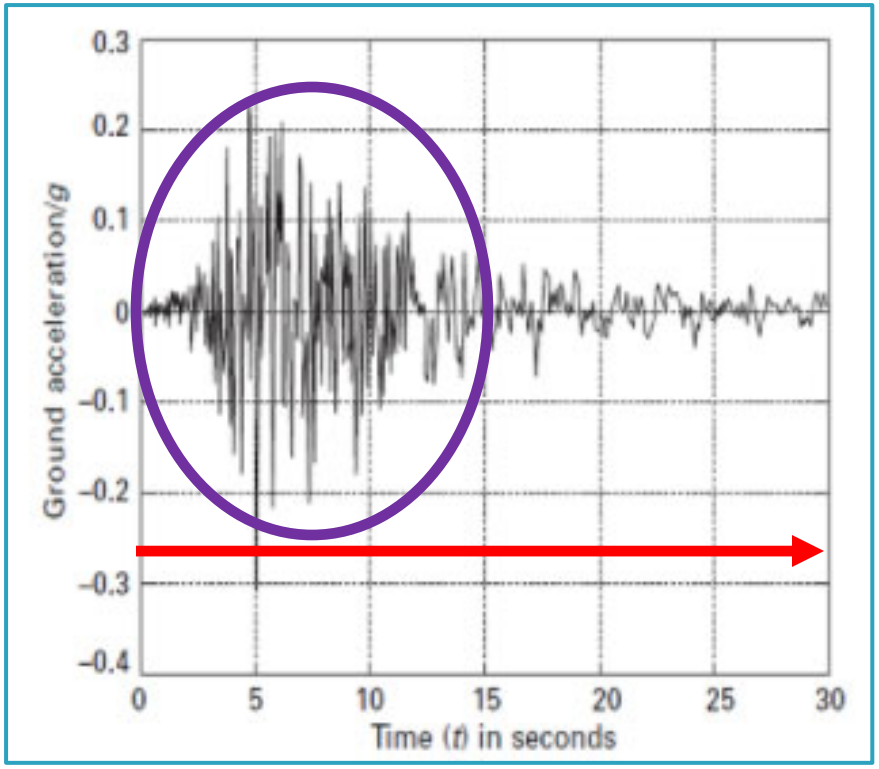
- How do you prepare for earthquakes?
- How do you get from core samples to a dredge plan?
- What does “done” mean? How do you know when you get there?
- Engineers, what do you do, what do you look like? (Breakout)

EARTHQUAKES

- Emergency Preparedness

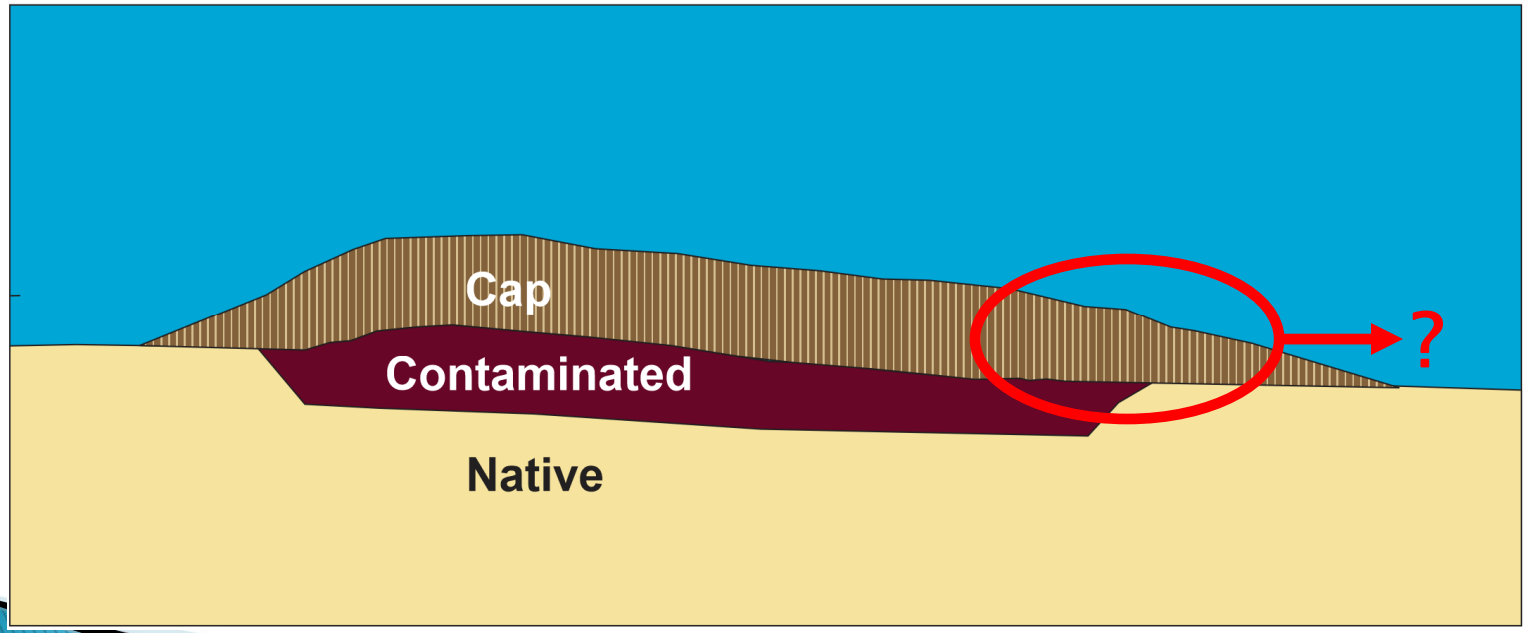
Earthquakes – Preparing for emergencies

- Portland Harbor is in a regional earthquake zone
- EPA's Remedial Design Guidance and Considerations
- 475 yr. event
  - Local & regional faults
    - Distance to site
    - Depth below the ground
    - Frequency/Intensity
  - Design parameters
    - Duration of shaking
    - Intensity of shaking
    - Predominant motions

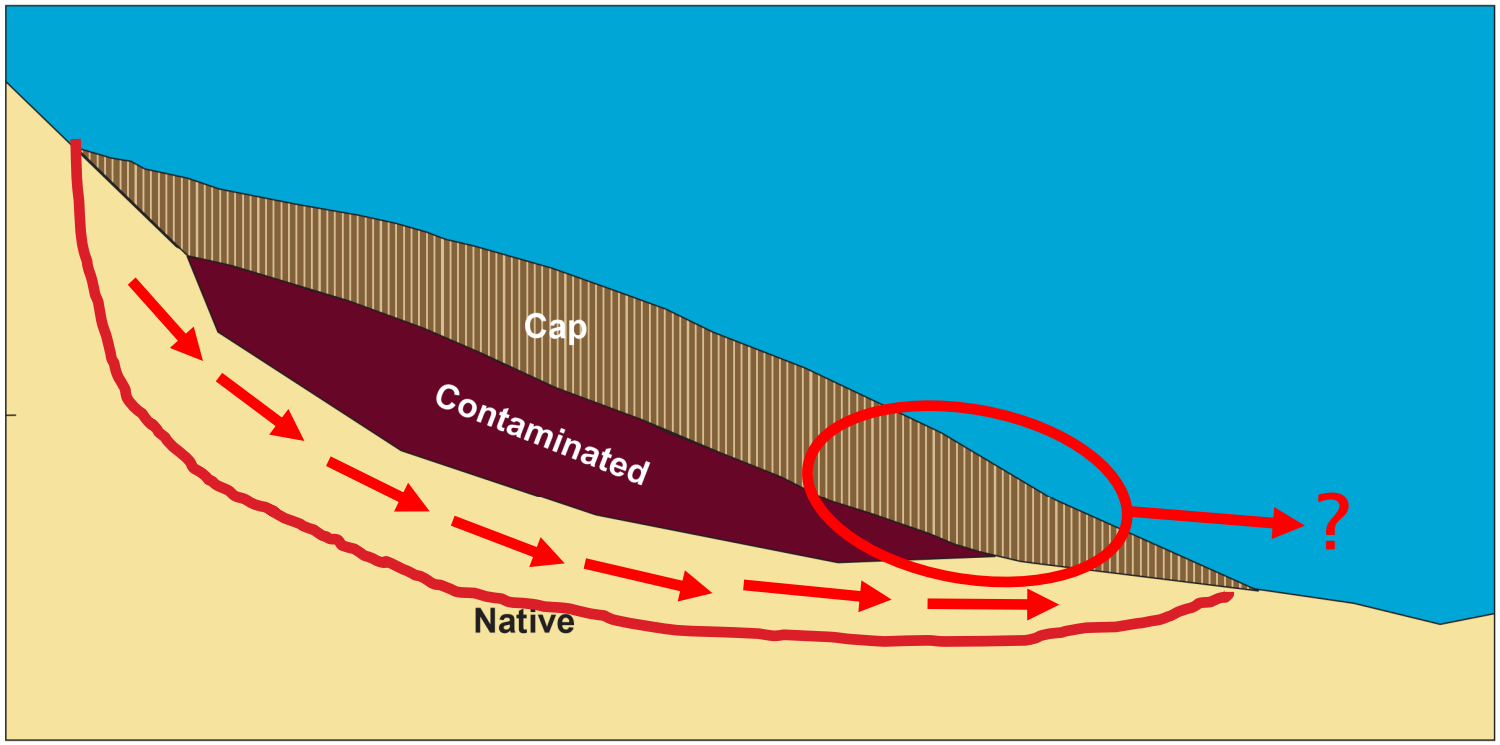


Earthquakes & Sediment Caps

- Design of Sediment Caps for 475 yr. event
  - Is cap stable (no exposure of contaminated sediment)?
  - Can design be modified to improve stability
  - Contingency Plan



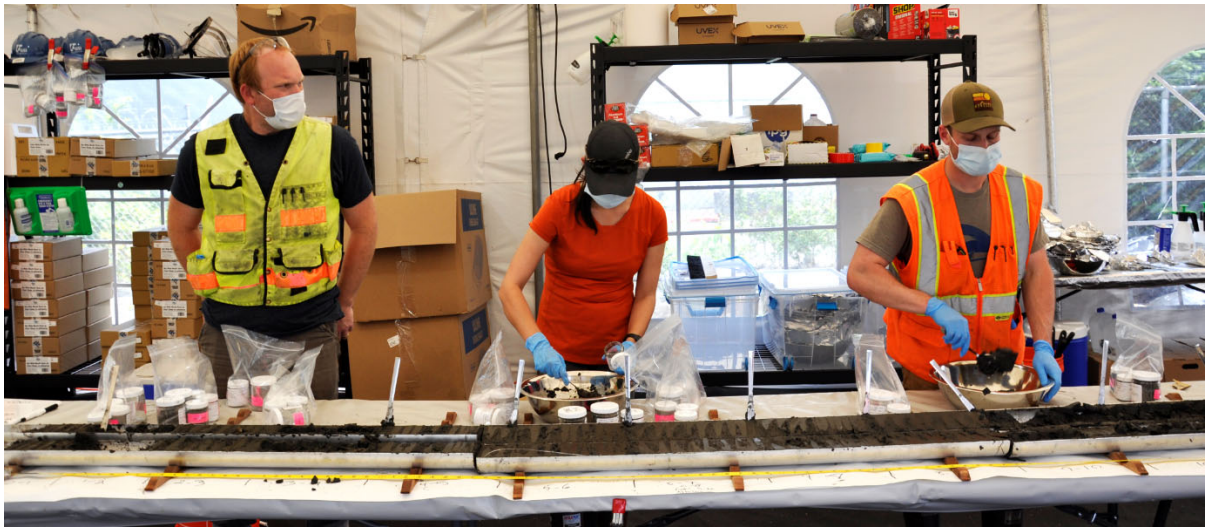
Earthquakes – Caps on Slopes

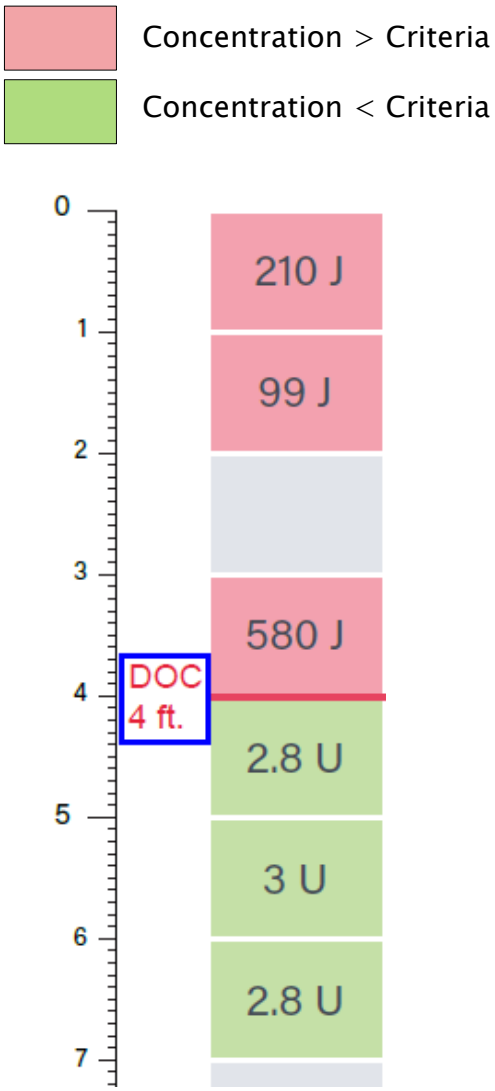


From Core Samples to Dredge Plan

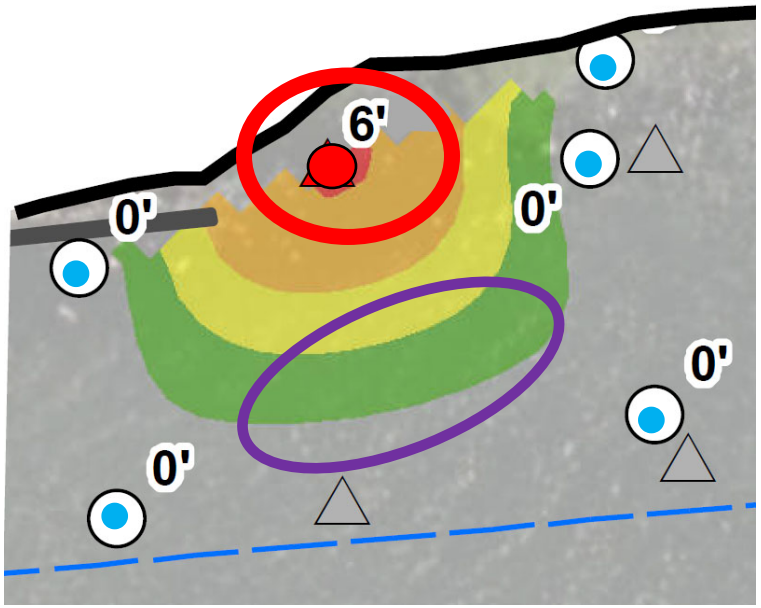
Depth of Contamination (DOC)

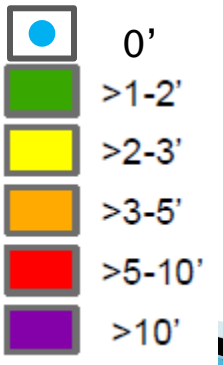
- Collect a sample every foot of the core
- Send samples to lab to test for ROD chemicals
- DOC – "Depth of Contamination" is deepest sample above criteria.





Map the Depth of Contamination
Interpolation between cores . . . .





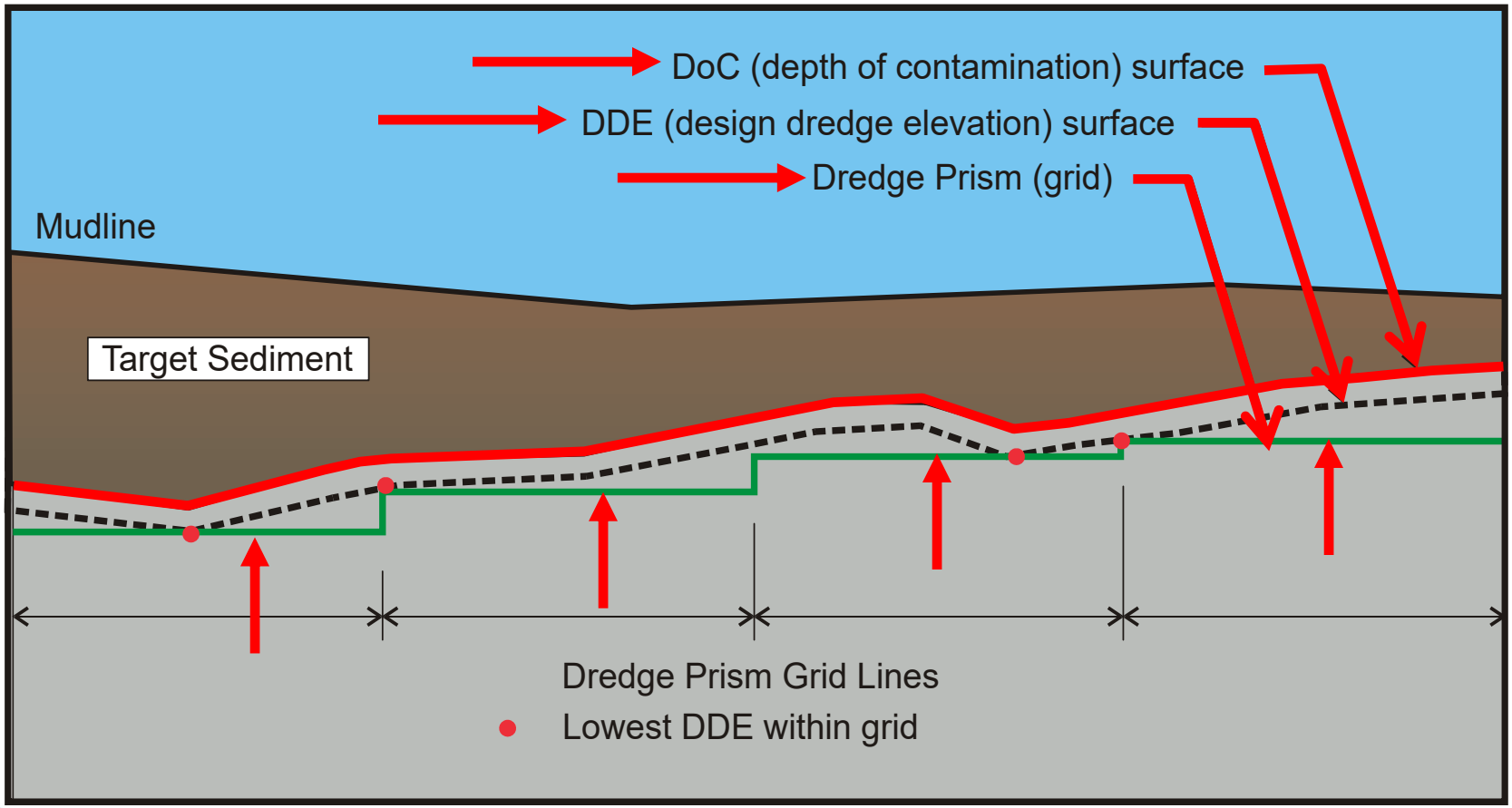
More Cores . . . .?

- Before dredging?
- After dredging?

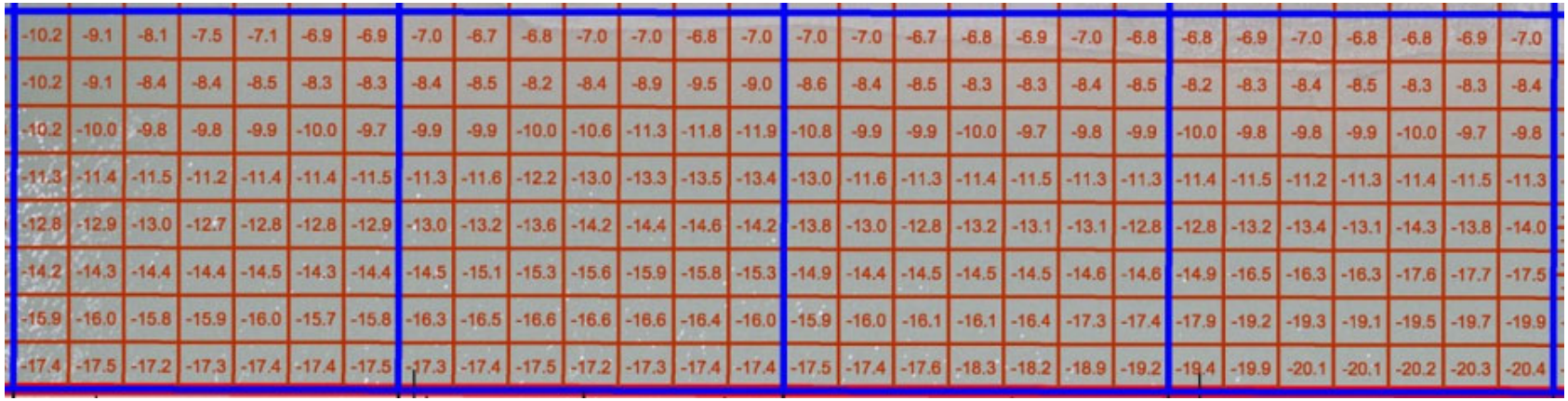
Lessons learned

- Fox River WI
- Hudson River NY
- More cores before dredging

From DOC to Dredge Plan



Dredge Plan


-10.2 -9.1 -8.1 -7.5 -7.1 -6.9 -6.9 -7.0 -6.7 -6.8 -7.0 -7.0 -6.8 -7.0 -7.0 -7.0 -6.7 -6.8 -6.9 -7.0 -6.8 -6.8 -6.9 -7.0 -6.8 -6.8 -6.9 -7.0
-10.2 -9.1 -8.4 -8.4 -8.5 -8.3 -8.3 -8.4 -8.5 -8.2 -8.4 -8.9 -9.5 -9.0 -8.6 -8.4 -8.5 -8.3 -8.3 -8.4 -8.5 -8.2 -8.3 -8.4 -8.5 -8.3 -8.3 -8.4
-10.2 -10.0 -9.8 -9.8 -9.9 -10.0 -9.7 -9.9 -9.9 -10.0 -10.6 -11.3 -11.8 -11.9 -10.8 -9.9 -9.9 -10.0 -9.7 -9.8 -9.9 -10.0 -9.8 -9.8 -9.9 -10.0 -9.7 -9.8
-11.3 -11.4 -11.5 -11.2 -11.4 -11.4 -11.5 -11.3 -11.6 -12.2 -13.0 -13.3 -13.5 -13.4 -13.0 -11.6 -11.3 -11.4 -11.5 -11.3 -11.3 -11.4 -11.5 -11.2 -11.3 -11.4 -11.5 -11.3
-12.8 -12.9 -13.0 -12.7 -12.8 -12.8 -12.9 -13.0 -13.2 -13.6 -14.2 -14.4 -14.6 -14.2 -13.8 -13.0 -12.8 -13.2 -13.1 -13.1 -12.8 -12.8 -13.2 -13.4 -13.1 -14.3 -13.8 -14.0
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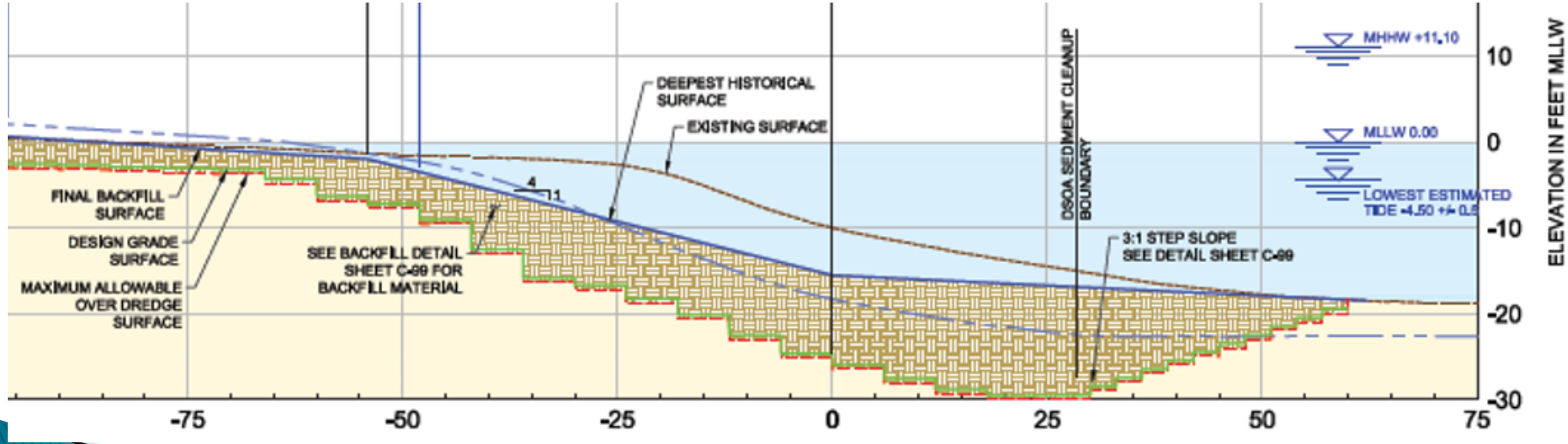
-17.4 -17.5 -17.2 -17.3 -17.4 -17.4 -17.5 -17.3 -17.4 -17.5 -17.2 -17.3 -17.4 -17.4 -17.5 -17.4 -17.6 -18.3 -18.2 -18.9 -19.2 -19.4 -19.9 -20.1 -20.1 -20.2 -20.3 -20.4


FINAL BACKFILL SURFACE
DESIGN GRADE SURFACE
MAXIMUM ALLOWABLE OVER DREDGE SURFACE
SEE BACKFILL DETAIL SHEET C-99 FOR BACKFILL MATERIAL
4
1
DEEPEST HISTORICAL SURFACE
EXISTING SURFACE
DSOA SEDIMENT CLEANUP BOUNDARY
3:1 STEP SLOPE SEE DETAIL SHEET C-99
MHHW +11.10
MLLW 0.00
LOWEST ESTIMATED TIDE +4.50 +/- 0.5
10
0
-10
-20
-30
-75
-50
-25
0
25
50
75
ELEVATION IN FEET MLLW

Remedial Design Process

- 30% Design

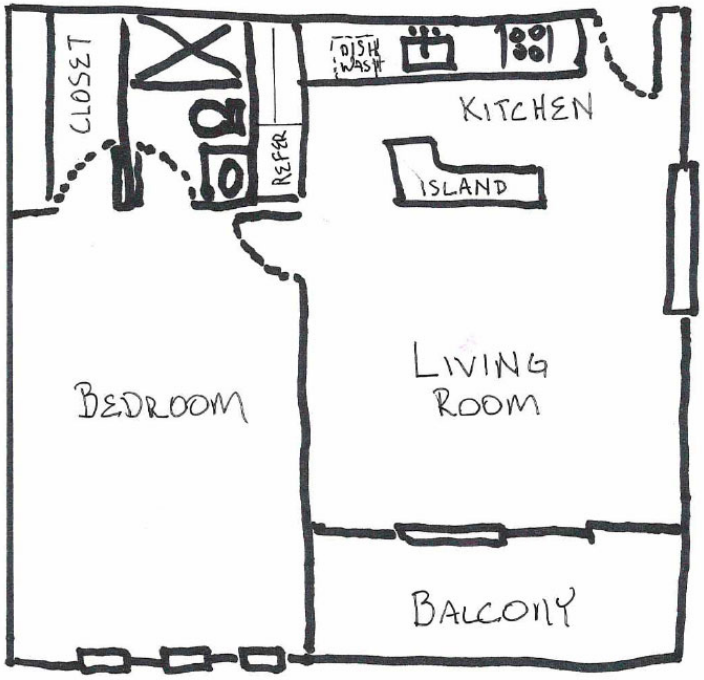
Preliminary (30%) Remedial Design

What is Preliminary (30%) Design?

<u>30% for a house</u> – **the basic floor plan** but without details of materials, plumbing, electric, cabinet, siding, roofing . . . .

<u>30% For PHSS</u> – Work in Progress.

- Preliminary "**Blue Prints**" – where dredging and capping are planned
- "**Some Assembly Required**" outline of specifications –
- Other supporting documents



What does “done” mean

- How do you know when you get there?

Monitoring, Monitoring, and more Monitoring

EPA's PHSS REMEDIAL DESIGN GUIDELINES AND CONSIDERATIONS (current version 4/23/2021)

- Construction Monitoring
- Remedy Performance Monitoring
- Remedial Action Objective (RAO) Monitoring

Construction Monitoring

- Was the remedy constructed as designed?
- During and immediately after construction
  - Hydrographic surveys – confirm removal depth, thickness of placed materials
  - Sediment cores (5/acre) – confirm removal of target material, and thickness of placed material

Performance Monitoring–Caps

- Is the remedy performing as designed?
- Periodically following construction
  - Porewater* – cap effectiveness
  - Surface sediment chemistry – outside sources
  - Hydrographic survey – cap stability

* To be determined

Remedial Action Objectives (RAOs) Monitoring

- Is the remedy achieving long-term objectives set in the ROD
- Monitor over the long term, supports 5-year reviews.
  - Surface sediment
  - Porewater*
  - Surface Water

* To be determined

Questions